A New Strategy For Buying Ground Weapon Systems . . .

PRODUCTION LEVELING

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Introduction

Today's Army is facing significant change. Convinced that heavy forces centered on the M1 Abrams tank might be self-limiting, planners are investing in a strategically lighter and operationally more agile force. To win battles on the ground, however, the Army still requires a highly lethal, mobile, survivable, and versatile ground system.

While planners define that system's form and function, there is a need to examine new manufacturing and fielding strategies. For example, how can the systems-development process be made more cost-effective and fielded systems be made more supportable? Can we profit from existing lessons learned? This article explores these questions by looking at an alternative strategy called "production leveling," a new approach to acquire future ground systems.

The Production Leveling Approach

To set the stage, consider a hypothetical system we'll call the Combat Assault Vehicle (CAV). Assume CAV is an entirely new combat system, one that can assume many roles, has advanced mobility and survivability features, employs different weapons for different missions, and is the principal weapon platform in combat battalions. The CAV is not a single system but a "system of systems," employing common components for multiple combat roles.

The first goal in devising a CAV acquisition concept ought to be *consistency and predictability* in production and deployment. Past systems, such as the M1 Abrams tank, were hampered by a significant "bulge" in early production that caused difficult modernization problems later. CAV, on the other hand, has a nearly level production stream to avoid the bulge effect. The heart of the strategy is to make *consistent* management decisions from the beginning to the end of production through deployment.

To implement this approach, the system is annually procured in battalion or unit sets—enough to equip the force structure and maintain consistent fielding packages. For example, suppose that 45 CAVs are fielded for each battalion. Assume also that there is a validated need for 80 battalions (Active and Reserve) in the force structure. Thus, roughly 3,600 systems comprise the objective quantity (a few extras added for training purposes). More systems might actually be needed, but numbers of battalions or numbers of vehicles per unit (more or less) can be adjusted over the course of the program. Numbers are less important than consistently managing the fielding packages. If more or fewer vehicles are needed, the program will be adjusted to meet that quantity. The same approach works for augmentations supporting the Marine Corps, foreign military sales, or coproduction requirements.

Let's take a closer look at this approach. Beginning in year 1, 90 CAVs might be purchased to equip 2 battalions while fielding the first CAV battalion. (Assume a 1-year lag time between purchase and fielding, i.e., the first battalion set was purchased in year 0.)

Production increases up to 4 battalion sets per year (it could be 2, 6, or x sets if needed) up to year 7. At this point, 23 base model battalions are bought and 21 fielded, but now accumulated modifications in the 5 intervening years are applied to a block upgrade on one battalion set of CAVs, which then undergoes validation testing.

The 5- to 7-year cycle of upgrades continues over the 20-year useful life of the CAV until the full complement is produced. For each upgrade phase, six battalions (perhaps one division or two brigades worth of CAVs) over 3 years become the "testbed" assets to prove out new modifications. These vehicles remain fielded and attain their useful life as the remaining units field the latest CAV modification. Eventually, something either replaces CAV, or, another CAV mod will be fielded back to the initial gaining units, thus replacing their 20-year-old models.

The CAV level-production process should foster more stable research, development, test, and evaluation (RDT&E) and procurement budgets and improve overall management of the program. In general, budget forecasting is easier and, even with increasing technical complexity from the CAV modifications, costs should be offset by manufacturing innovations, engineering breakthroughs, and other savings.

The Upside To The CAV Case

The CAV strategy's major advantage is consistency. The program never really ends until the next generation system is fielded. By the Army consciously deciding to field at a level rate, production endures over time and the "pure" sustainment phase is avoided. Uncertain support of out-of-production fielded systems is replaced with modernized product improvement to ongoing production models. Other government benefits include predictable technical manual changes, resourced test and experimentation, easier provisioning, and better coordinated equipment changes and technology insertions.

Beyond these government benefits, industry also gains. Contractor resources will be directed at a known quantity, which lowers manufacturing costs and contributes to more efficient production and healthier profits. Ultimately, restricted budgets make cost containment a necessity.

Additionally, with stable production, the industrial base remains hot, retooling is

reduced, and technical expertise remains fresh. Stability also facilitates configuration control. Retrofit operations can be fine-tuned to mirror production processes and, ultimately, upgrades will be fielded sooner.

The CAV approach is particularly useful when there is low risk of a major war because large numbers of systems are not immediately needed. Instead, it makes more sense to field and upgrade systematically to tailor capability as the threat evolves. Tailoring can occur by moving battalions from Active to Reserve forces, or vice-versa as the threat changes.

CAV benefits should cascade throughout the force, including support elements. Producing known quantities of the main ground combat system will result in better decisionmaking and enhanced capability and efficiency of all supporting systems.

The Downside

The CAV approach does have some disadvantages. One apparent disadvantage is the seemingly high state of obsolescence in the majority of the force. The longest fielded CAV systems will have increasingly less capability over the life of the program. This is particularly true if technological "leap-aheads" occur every 6-8 years. To deal with this problem, a portion of the annual procurement budget should be earmarked for retrofitting older versions.

Another disadvantage is that CAV might foster "armies within the Army," where units with different capabilities exist simultaneously. Fielding of only a few battalion sets at a time to a division may be unavoidable; however, management could mandate subunits (such as a brigade or regiment) be fielded in the same timeframe as the new system. Logisticians may argue that this fosters multiple support requirements. While true to a degree, the problem depends on whether the Army still employs division-sized elements when CAV is fielded. Speculation seems to lean more toward a distributed battlefield where brigade-sized or smaller units operate, a view consistent with the Army's emerging medium-brigade fielding plans.

Opening scenes of a major conflict could present problems for CAV. Combat leaders of early deploying forces will want the very best systems in the hands of their soldiers. There will be pressure to bring all forces up to snuff quickly. One might argue that under the CAV scenario, too few of the best types would be available to equip early entry forces.

This perception is mitigated by the fact that in all years, save those when CAV first enters test and evaluation, several battalions will have been equipped with the latest modification. In fact, the average probability for any year that a single given crew has the latest CAV configuration is 0.206. While this appears low, it actually exceeds the M1 Program, where since 1980 under the same conditions, the average probability was only 0.184 that a given crew was equipped with the latest vehicle configuration.

Another concern is whether crisis surge potential exists. Although a concern, the M1 Program faced the same situation in its earliest years, but 10 production years passed before the Persian Gulf War demanded a production surge. With the planned retrofit of older CAV models, the fleet should be close in capability to the latest production model. A surge retrofit program may also be easier to manage in an emergency than rapidly increasing new production. Additionally, under a level-production concept, some capability should exist in production facilities to increase production through adding additional shifts and employing existing underemployed production capacity.

Another subtle argument is the CAV implications to industrial competition. For a single 20-year program, a prime integrating contractor would be inevitable. Opportunities for competition at this level, therefore, would arguably diminish. With reduced competitive pressures, one might argue that prices will rise above the rate of savings from the likely multiyear CAV contracts. However, the reality today is that only two major combat vehicle producers stand in the competitive arena and neither are major producers of commercial products. Indeed, they operate at marginal efficiency because of unstable government purchasing.

Why does this situation exist? An often-heard criticism of military programs is that major automotive producers hesitate to play precisely because production is unpredictable. Perceived restrictive requirements, lengthy RDT&E, and government red tape make it problematic whether production can recoup costs. The government sales volume, compared with commercial sales, is such that diverting scarce engineering and production talent is viewed as counterproductive. So what difference could the CAV Program make?

The competitive balance might change under a structured and predictable CAV approach. Perhaps incentives such as commitment to commercial standards, employing systems close to the commercial designs, or government purchase of the technical data could generate greater competitive interest. These factors might actually stimulate a healthier Defense vehicle industry.

Do We Take The Step?

When a needed capability surfaces, the urge is to strike while the need is hot. But that strategy has consequences the day the threat changes. Decisions then are inevitable on whether to build new systems, deploy resources to upgrade existing systems, or to simply accept the risky situation. Meanwhile, system capability dips and it becomes increasingly difficult to re-energize industry for a crisis.

Production leveling has promise in avoiding some of these problems. It can be easier to sustain, hardier in times of economic constraint, and potentially popular with industry. The concept offers promise in several directions that should be carefully weighed by decisionmakers as we head into the next significant round of combat vehicle development.

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